defectives, that between 40 and 50 per cent. over the age of seven were either mentally defective or dull, that the percentage of 22·5 of deaths among the children was very high, and that the belief that abnormal fertility was characteristic of mental defectives was not confirmed. Although this view appears to have arisen mainly because of cases which received publicity in the Courts and by the Press, it has not been accepted generally by prison Medical Officers in regard to delinquent defectives.

The article refers to the greater incidence of abnormal mental conditions in families of higher- than in families of lower-grade defectives, to the conclusion that certain rare types of mental defect are recessive characters, to the probability that further investigation and study will demonstrate that the Mendelian theory will explain satisfactorily the transmission of all types of mental defect and disorder; that in regard to mental disorder there is probably in the majority of cases an inherited predisposition, and that were it not for this predisposition exciting factors would have comparatively little effect. The advantages and disadvantages of compulsory and voluntary sterilization, and the effects of vasectomy and salpingectomy are also set out briefly.

Probably all will agree with the author that the Carrier constitutes the crux of the problem, for few can be unacquainted with sporadic and unexpected cases of mental defect in the families of their friends and associates.

The Editor of the *Howard Journal* calls attention to the fact that the publication of this article does not in any way commit the Howard League to support the policy outlined on which it has taken no corporate decision. The readers of the *Journal* may be influenced by Dr. Crowley's reference to the statement of the Brock Committee that sterilization " does nothing to improve the mental condition and it does not lessen sexual activity. The unstable and anti-social defective remains unstable and anti-social. The thief remains a thief. The erotic girl or youth will still need institutional care. The impossibility of procreation will not save them from being a social menace."

The article is clear and moderate. It will appeal particularly to those who consider that in this matter, as in other social problems, it is necessary that not only the experts, but the public and the individuals who may be immediately concerned, distinguish between what is essential and what is subordinate.

W. NORWOOD EAST.

MIND AND BRAIN

Campion, George C., and **Smith, Professor Sir Grafton Elliot.** *The Neural Basis of Thought.* London, 1934. Kegan Paul, Trench, Trubner & Co. Ltd. Pp. viii + 167. Price 9s.

THIS book aims, we are told, " at presenting the neurological aspect of a theory of knowledge which was published eleven years ago." Whilst the theory is Campion's, the neurological support is Smith's, and the thesis to be established is " that the multitudinous and diverse concepts in their equally multitudinous and diverse groupings have their neural counterparts in what Sir Henry Head has called ' neural schemata.' " But such a thesis is not new nor does it to-day need the fancied weight of authority to give it verisimilitude. To mention but a few—Wilson's *Education, Personality and Crime,* published in 1908; Goddard's *Psychology of the Normal and Subnormal,* 1924; and A. C. Douglas's *Physical Mechanism of the Human Mind,* 1932—all deal with a similar thesis, that concepts have their neural counterparts, although, to quote Campion and Smith, " the terms in which their conclusions are expressed differ in the way which is usual where workers in the same field of research are engaged on the same problem, but working in isolation from one another."

The histological evidence adduced in this book in support of Campion's theories is definitely not up to date and rather beside the point for, with one or two exceptions, there is little or no reference to any work in

this field later than 1914. More recently informed authors would surely never have believed that Campion's conception of a thalamo-cortical circulation of neural impulses was a discovery of such devastating significance as to strike the reader as " fantastic." What does strike one as being a little odd—though not, perhaps, definitely " fantastic "—is that anyone to-day should have thought that experts still held the belief that nerve impulses came to dead ends in cortical centres, the converse of which necessarily implies a neuronal circulation of impulses. So far, then, from being either new or original, the conception of a neuronal circulation is essential and has long been accepted in some form or another and in some cases—notably for the cerebellum by Cajal, and for the cortex by Berry—has been worked out structurally in considerable detail. If a sentence, presumably by Campion, on page 97 be paraphrased to read that " circulation of neural impulses is fundamental for the neurology of what we colloquially call thought," then the dictum is true and has apparently recently been actually demonstrated by Adrian, though it had already been foretold from structural studies alone. Theory, in this case, thus bears the same relation to fact as did the calculations of Adams and Leverrier to the discovery of Neptune.

That " the sensory cortex is the storehouse of past impressions " was good enough in 1911-12, but a vague statement of this sort —no matter on whose authority—does not, some quarter of a century later, suffice. Subsequent investigators, whose writings seem to have escaped these authors, have got so far beyond this primitive conception as now to be inquiring how and in what form these impressions are so stored. It does not seem to have occurred to Mr. Campion that the logical interpretation of the statement he quotes is either that memories, as such, are actually stored up in cortical cells, or that the neo-pallial neurones secrete thought as do liver cells bile. As a matter of actual fact, brain cells are not the storehouses of past impressions, nor do they secrete thought. If the reader of this review or, better still, of the work under review, will ponder over the facts for himself, without the assistance of any neurologist, he will see that so long as light waves fall upon the retina, just so long will the optic nerve fibres be actuated to discharge centrally directed neuronal impulses which energize, or alter in some form, the innumerable cortical granular cells of the visuo-sensory cortex. As we feel sure his co-author will have reminded Mr. Campion that we see with the brain, not the eye, it is only necessary to add that somewhere within these cells there occurs a transformation of a physical energy (light waves) into a neuronal (sight), which is at once as demonstrable in its manifestation as it is baffling in its nature. It is by this marvellous and singular property of transforming one type of energy into another and of retaining, until wanted, that so transformed energy, that the human brain—when sufficiently developed, which is by no means always the case—produces these phenomena of thought, memory, speech and reason which we dignify by the collective term " mind." The sensory cortex is thus not so much a storehouse of past impressions as a reservoir of potential and accumulated energy, transformed from those many physical stimuli to which the human body is designed to react and by which it is so continually bombarded from birth to death.

We picked up this book with a pleasurable anticipation, and laid it down again with an accomplished disappointment. It does not do what its title suggests—explain the mechanism of thought. Its range of the subject is extraordinarily limited, and its quotation of authority, though restricted to the high priests, is inadequate. It is, nevertheless, a healthy sign when psychologists seek the aid of anybody—even anatomists—to help them out with a rational explanation of the mechanism of the human brain, of the structure, functions and diseases of which they remain, at least to our thinking, so unnecessarily ignorant.

That we are not alone in thus regretting the failure of psychologists to apply the many available facts of scientific, rather than of clinical, neurology to the phenomena of mind is emphasized by a remark of Judson

Herrick: " the competence of the men who are working at it," i.e. the neurological explanation of mind, " is certainly as good as is that of the psychologists . . . the trouble seems to be that these researches are so recondite that they must of necessity infiltrate into common knowledge and literature very slowly." They are, nevertheless, available.

B.